



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/932,050	08/17/2001	Yoshinori Atsumi	09792909-5142	4510

26263 7590 06/16/2006

SONNENSCHN NATH & ROSENTHAL LLP
P.O. BOX 061080
WACKER DRIVE STATION, SEARS TOWER
CHICAGO, IL 60606-1080

EXAMINER

DOVE, TRACY MAE

ART UNIT PAPER NUMBER

1745

DATE MAILED: 06/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/932,050	Applicant(s) ATSUMI ET AL.	
	Examiner Tracy Dove	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 March 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4,14-19 and 22-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4,14-19 and 22-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office Action is in response to the communication filed on 3/29/06. Applicant's arguments have been considered, but are not persuasive. Claims 1, 4, 14-19 and 22-26 are pending. This Action is FINAL.

Claim Objections

Claim 22 is objected to because of the following informalities: the term "NiSi₂" appears twice in the claimed Markush group. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1, 4, 14-19 and 22-26 are rejected under 35 U.S.C. 102(b) as being anticipated by Inamasu, JP 10-312789.

Inamasu teaches a nonaqueous electrolyte secondary battery comprising an active material phosphoric acid compound of the formula Li_xFePO₄ (x depends of the valence of Fe) for the positive or negative electrode active material (0007,0011). Note iron has two possible

Art Unit: 1745

valence states, 2+ or 3+, and phosphate has a 3- charge. Therefore, $0 \leq x \leq 1$. The Li_xFePO_4 active material has an average grain size (particle diameter) of 0.1-100 μm (0020). Examiner points out that Li_xFePO_4 is a preferred compound disclosed by the present specification on page 5. It is important to use a small active material to improve cycle characteristics of the battery (0007). When the phosphoric acid compound is used as the positive active material, the negative active material may be a carbon material such as graphite, lithium or a lithium alloy. Graphite intercalates (dopes) lithium (0018). Lithium metal, lithium alloy and carbon material are all typical materials used for the negative electrode active material of the nonaqueous secondary battery (0002-0004). The electrode materials may be sintered (0023). The nonaqueous electrolyte may include an electrolyte solution comprising an organic solvent (e.g., propylene carbonate) and an electrolyte salt (e.g., LiClO_4) (0012).

The electrodes may include conductive agents, binders or fillers (0013). The electrodes are configured into a film-like structure (molded body) (0009). The negative electrode may include silicon or germanium ($t=0$ and $u=0$) (0018). Thus the claims are anticipated.

*

Claims 4, 19 and 22-26 are rejected under 35 U.S.C. 102(b) as being anticipated by Kamauchi et al., US 5,705,296.

Kamauchi teaches a lithium secondary battery comprising a positive electrode, a negative electrode and an electrolyte wherein the positive electrode is composed of a lithium-cobalt phosphate positive active material. The lithium-cobalt phosphate is preferably LiCoPO_4 (col. 4, lines 16-19) and the active material may comprise only LiCoPO_4 (col. 4, lines 32-34). Transition metals besides cobalt such as Ni, Fe, Mn, Cr and V may be contained in the lithium-phosphate

Art Unit: 1745

positive active material (col. 4, lines 42-44). The negative electrode may be a carbon material doped with lithium ion (col. 6, lines 15-23). The electrolyte comprises a electrolytic salt and a nonaqueous solvent (col. 7, lines 45-60). The positive electrode may comprise at least the lithium-transition metal phosphate active material, an electrical conducting agent and a binder (col. 4, lines 61-65). The mixture is blended and formed into a positive electrode having desirable shape and size by a known method such as compression molding (col. 5, lines 18-22). The carbon active material of the negative electrode is mixed with a binder and formed into a carbon negative electrode of a desirable shape and size by compression molding (col. 7, lines 40-44). The positive active material has an average particle size of 0.01-20 μm (col. 2, lines 47-66). The carbon material of the negative electrode may be graphite (col. 7, lines 38-39). The electrolyte solution includes a solvent and a salt. The salt may be LiClO_4 and the solvent may be propylene carbonate (col. 7, lines 45-60).

Thus the claims are anticipated.

*

Claims 1, 4, 14-19 and 23-26 are rejected under 35 U.S.C. 102(e) as being anticipated by Yamada et al., US 6,632,566.

Yamada teaches a nonaqueous electrolyte secondary battery employing a positive electrode active material containing a compound represented by the formula Li_xMyPO_4 wherein $0 < x \leq 2$ and $0.8 \leq y \leq 1.2$. In the formula, M is a 3d transition metal and the positive active material has a grain size not larger than 10 μm (abstract). The positive active material may be LiFePO_4 (claim 2). The negative electrode may comprise a carbon material capable of doping/undoping

Art Unit: 1745

lithium (4:56-65). The electrolyte materials are disclosed at column 6, line 66 through column 7, line 14. Thus the claims are anticipated.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 4, 14-19 and 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goodenough et al., WO 97/40541.

Goodenough teaches a nonaqueous electrolyte secondary battery comprising a cathode, anode and electrolyte. A preferred cathode active material may be an olivine compound such as LiFePO_4 (3:8-13). The anode may be a reductant host for lithium or elemental lithium itself. Preferably, the anode material will be a reductant host for lithium (8:24-28). Examples of electrolyte salts and solvents are disclosed on page 9, lines 5-15. Note a reductant host for lithium is capable of doping/dedoping lithium.

Goodenough does not explicitly teach the particle size of the olivine compound.

However, Goodenough teaches when a chemical reaction of a cell involves ionic transport across an interface, equation 9 on page 11 dictates construction of a porous, small-particle electrode. One of skill would have been motivated to provide a small particle size for the olivine compound in order to reduce the resistance to transport of the lithium ion across the electrolyte-electrode interface of the lithium secondary battery of Goodenough (page 11). Furthermore, the courts have held that where the only difference between the prior art and the

Art Unit: 1745

claimed invention was a recitation of relative dimensions (particle size) of the claimed element (cathode active material) and an element having the claimed relative dimensions would not perform differently than the prior art element (cathode active material), the claimed element was not patentably distinct from the prior art device. See MPEP 2144.04.

Goodenough does not explicitly teach the carbon negative electrode comprises a sintered carbon material.

However, Moriguchi teaches a lithium secondary battery having an anode comprising a graphite (carbon) material. A conventional method is used to produce the negative electrode of Moriguchi. As employed in prior art lithium secondary batteries, a graphite powder is applied to a metal base serving as a current collector with the aid of a suitable binder and is shaped thereon. Alternatively, a sintered electrode may be produced from the graphite powder without use of a binder. Thus, the negative electrode may be comprised predominantly or solely of the graphite powder (col. 15, lines 31-39).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because Moriguchi teaches it is conventional to use a sintered graphite material anode without use of a binder or an un-sintered graphite material anode with a binder for the anode of a lithium secondary battery. One of skill would have been motivated to use a the conventional graphite anode of Moriguchi as the anode for the lithium battery of Goodenough because the prior art teaches such anodes are well known for use in lithium secondary batteries. Moriguchi teaches both carbon electrodes formed with a binder and sintered electrodes (without binder) are conventional for use as negative electrodes for lithium

Art Unit: 1745

batteries. The graphite material is a reductant host material for lithium. Goodenough teaches the reductant host material is preferred over lithium metal.

*

Claims 1 and 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamauchi et al., US 5,705,296 in view of Moriguchi et al., US 6,576,369.

Kamauchi teaches a lithium secondary battery comprising a positive electrode, a negative electrode and an electrolyte wherein the positive electrode is composed of a lithium-cobalt phosphate positive active material. The lithium-cobalt phosphate is preferably LiCoPO_4 (col. 4, lines 16-19) and the active material may comprise only LiCoPO_4 (col. 4, lines 32-34). Transition metals besides cobalt such as Ni, Fe, Mn, Cr and V may be contained in the lithium-phosphate positive active material (col. 4, lines 42-44). The negative electrode may be a carbon material doped with lithium ion (col. 6, lines 15-23). The electrolyte comprises an electrolytic salt and a nonaqueous solvent (col. 7, lines 45-60). The positive electrode may comprise at least the lithium-transition metal phosphate active material, an electrical conducting agent and a binder (col. 4, lines 61-65). The mixture is blended and formed into a positive electrode having a desirable shape and size by a known method such as compression molding (col. 5, lines 18-22). The carbon active material of the negative electrode is mixed with a binder and formed into a carbon negative electrode of a desirable shape and size by compression molding (col. 7, lines 40-44). The positive active material has an average particle size of 0.01-20 μm (col. 2, lines 47-66). The carbon material of the negative electrode may be graphite (col. 7, lines 38-39). The electrolyte solution includes a solvent and a salt. The salt may be LiClO_4 and the solvent may be propylene carbonate (col. 7, lines 45-60).

Art Unit: 1745

Kamauchi does not explicitly teach the carbon negative electrode comprises a sintered carbon material.

However, Moriguchi teaches a lithium secondary battery having an anode comprising a graphite (carbon) material. A conventional method is used to produce the negative electrode of Moriguchi. As employed in prior art lithium secondary batteries, a graphite powder is applied to a metal base serving as a current collector with the aid of a suitable binder and is shaped thereon. Alternatively, a sintered electrode may be produced from the graphite powder without use of a binder. Thus, the negative electrode may be comprised predominantly or solely of the graphite powder (col. 15, lines 31-39).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because Moriguchi teaches it is conventional to produce a sintered graphite material anode without use of a binder. One of skill would have been motivated to use a the conventional sintered graphite anode of Moriguchi as the anode for the lithium battery of Kamauchi because the prior art teaches such anodes are well known for use in lithium batteries. Moriguchi teaches both carbon electrodes formed with a binder, taught by Kamauchi, and sintered electrodes (without binder) are conventional methods for forming carbon negative electrodes for lithium batteries.

Response to Arguments

Applicant's arguments filed 2/17/06 have been fully considered but they are not persuasive.

Applicant argues Inamasu fails to teach a cathode composed of $\text{Li}_x\text{Fe}_y\text{PO}_4$ having an olivine structure and having a particle diameter not greater than 1 micrometer and wherein

Art Unit: 1745

$0 < x \leq 2$ and $1 < y \leq 2$. However, Inamasu teaches a nonaqueous electrolyte secondary battery comprising an active material phosphoric acid compound of the formula Li_xFePO_4 (x depends of the valence of Fe) for the positive or negative electrode active material (0007,0011). Note iron has two possible valence states, 2+ or 3+, and phosphate has a 3- charge. Therefore, $0 < x \leq 1$. The Li_xFePO_4 active material has an average grain size (particle diameter) of 0.1-100 μm (0020). Examiner points out that Li_xFePO_4 is a preferred compound disclosed by the present specification on page 5. It is important to use a small active material to improve cycle characteristics of the battery (0007). Applicant's argument that the particle size refers to the negative electrode material is not persuasive. Inamasu uses the phrase "forward negative electrode" which refers to the positive electrode (forward negative electrode) of the battery (0010). As is well known in the battery art, the designation of "positive" or "negative" electrode depends on whether the battery is charging or discharging. Reduction occurs at the cathode.

Applicant argues Kamauchi fails to teach a cathode composed of $\text{Li}_x\text{Fe}_y\text{PO}_4$ having an olivine structure and having a particle diameter not greater than 1 micrometer and wherein $0 < x \leq 2$ and $1 < y \leq 2$. However, Kamauchi teaches a lithium secondary battery comprising a positive electrode comprising a lithium-iron phosphate positive active material (col. 4, lines 42-44). The positive electrode may comprise at least the lithium-transition metal phosphate active material, an electrical conducting agent and a binder (col. 4, lines 61-65). The mixture is blended and formed into a positive electrode having desirable shape and size by a known method such as compression molding (col. 5, lines 18-22). The positive active material has an average particle size of 0.01-20 μm (col. 2, lines 47-66). Applicant's reference to column 5, lines 23-29

Art Unit: 1745

is not persuasive because Kamauchi teaches the positive electrode active material has an average particle size of 0.01-20 μm (col. 2, lines 47-66) (not just the oxide active material).

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Therefore, Applicant's arguments regarding the claimed invention are not persuasive.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).

Art Unit: 1745

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

June 14, 2006



TRACY DOVE
PRIMARY EXAMINER